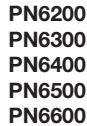
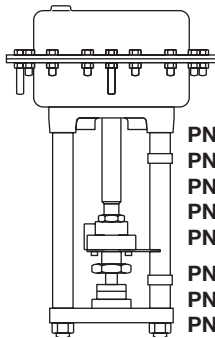
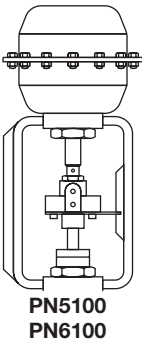


**PN5000 and PN6000 Series  
Pneumatic Actuators  
Installation and Maintenance Instructions**

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- 1. Safety information*
- 2. General product information*
- 3. Installation*
- 4. Commissioning*
- 5. Maintenance*
- 6. Spare parts*



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# 1. Safety information

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Safe operation of these products can only be guaranteed if they are properly installed, commissioned, used and maintained by qualified personnel (see Section 1.11) in compliance with the operating instructions. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

## 1.1 Intended use

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended use/application. The products comply with the requirements of the European Pressure Equipment Directive 97/23/EC and fall within the category 'SEP'. It should be noted that products within this category are required by the Directive not to carry the CE mark.

- i) These products have been specifically designed for use on compressed air, which is in Group 2 of the above mentioned Pressure Equipment Directive. The products' use on other fluids may be possible but, if this is contemplated, Spirax Sarco should be contacted to confirm the suitability of the product for the application being considered.
- ii) Check material suitability, pressure and temperature and their maximum and minimum values. If the maximum operating limits of the product are lower than those of the system in which it is being fitted, or if malfunction of the product could result in a dangerous overpressure or overtemperature occurrence, ensure a safety device is included in the system to prevent such over-limit situations.
- iii) Determine the correct installation situation and direction of fluid flow.
- iv) Spirax Sarco products are not intended to withstand external stresses that may be induced by any system to which they are fitted. It is the responsibility of the installer to consider these stresses and take adequate precautions to minimise them.
- v) Remove protection covers from all connections before installation.

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## 1.2 Access

Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product. Arrange suitable lifting gear if required.

## 1.3 Lighting

Ensure adequate lighting, particularly where detailed or intricate work is required.

## 1.4 Hazardous liquids or gases in the pipeline

Consider what is in the pipeline or what may have been in the pipeline at some previous time. Consider: flammable materials, substances hazardous to health, extremes of temperature.

## 1.5 Hazardous environment around the product

Consider: explosion risk areas, lack of oxygen (e.g. tanks, pits), dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery.

## 1.6 The system

Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolation valves, electrical isolation) put any other part of the system or any personnel at risk?

Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

## 1.7 Pressure systems

Ensure that any pressure is isolated and safely vented to atmospheric pressure. Consider double isolation (double block and bleed) and the locking or labelling of closed valves. Do not assume that the system has depressurised even when the pressure gauge indicates zero.

## 1.8 Temperature

Allow time for temperature to normalise after isolation to avoid danger of burns.

## 1.9 Tools and consumables

Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine Spirax Sarco replacement parts.

## 1.10 Protective clothing

Consider whether you and/or others in the vicinity require any protective clothing to protect against the hazards of, for example, chemicals, high/low temperature, radiation, noise, falling objects, and dangers to eyes and face.

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## 1.11 Permits to work

All work must be carried out or be supervised by a suitably competent person. Installation and operating personnel should be trained in the correct use of the product according to the Installation and Maintenance Instructions.

Where a formal 'permit to work' system is in force it must be complied with. Where there is no such system, it is recommended that a responsible person should know what work is going on and, where necessary, arrange to have an assistant whose primary responsibility is safety.

Post 'warning notices' if necessary.

## 1.12 Handling

Manual handling of large and/or heavy products may present a risk of injury. Lifting, pushing, pulling, carrying or supporting a load by bodily force can cause injury particularly to the back. You are advised to assess the risks taking into account the task, the individual, the load and the working environment and use the appropriate handling method depending on the circumstances of the work being done.

## 1.13 Residual hazards

In normal use the external surface of the product may be very hot. If used at the maximum permitted operating conditions the surface temperature of some products may reach temperatures of 90°C (194°F).

Many products are not self-draining. Take due care when dismantling or removing the product from an installation (refer to 'Maintenance instructions').

## 1.14 Freezing

Provision must be made to protect products which are not self-draining against frost damage in environments where they may be exposed to temperatures below freezing point.

## 1.15 Disposal

Unless otherwise stated in the Installation and Maintenance Instructions, this product is recyclable and no ecological hazard is anticipated with its disposal providing due care is taken.

## 1.16 Returning products

Customers and stockists are reminded that under EC Health, Safety and Environment Law, when returning products to Spirax Sarco they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk. This information must be provided in writing including Health and Safety data sheets relating to any substances identified as hazardous or potentially hazardous.

## — 2. General product information —

### 2.1 Description

A range of compact multi-spring linear actuators with 6 diaphragm sizes to match the requirements of different valves at various differential pressures. Each actuator is fitted with a stroke indicator and incorporates a semi-rolling diaphragm that gives good linearity over the operating stroke.

#### Available actuator types

<b>PN5100 series</b>	Spring extend spindle, single spring, cast yoke
<b>PN5200 to PN5600 series</b>	Spring extend spindle, multi-spring, pillar mounted
<b>PN6100 series</b>	Spring retract spindle, single spring, cast yoke
<b>PN6200 to PN6600 series</b>	Spring retract spindle, multi-spring, pillar mounted

These actuators are designed to operate with 2-port LE, LEA, KE and KEA series valves and 3-port QL series valves as listed below:

#### Control valves

Valve range	Valve sizes	Travel
<b>LE and LEA series (2-port)</b>	DN15 to DN50 (½" to 2")	20 mm
<b>KE and KEA series (2-port)</b>		(¾")
<b>QL series (3-port)</b>		
<b>LE and LEA series (2-port)</b>	DN65 to DN100 (2½" to 4")	30 mm
<b>KE and KEA series (2-port)</b>		(1¾")
<b>QL series (3-port)</b>		

### 2.2 Technical data

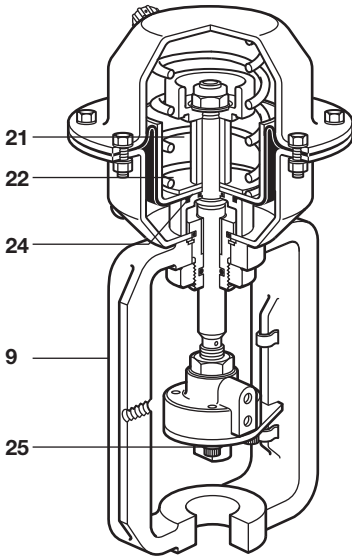
<b>Temperature range</b>	-20 to +110°C (-4 to +230°F)	
<b>Maximum air pressure</b>	<b>PN5100 to PN5400 and PN6100 to PN6400</b>	6 bar g (87 psi g)
	<b>PN5500, PN5600 and PN6500, PN6600</b>	2.5 bar g (36 psi g)
<b>Connection</b>	<b>PN5100 and PN5200 and PN6100 and PN6200</b>	⅛" BSP
	<b>PN5300 to PN5600 and PN6300 to PN6600</b>	¼" BSP
<b>Linearity</b>	2%	
<b>Hysteresis</b>	3% maximum	

### 2.3 Compressed air volumes

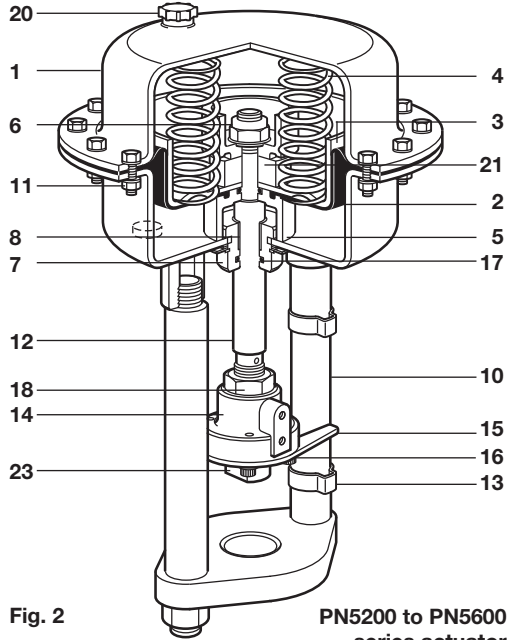
Actuator types	Travel	litres	ft <sup>3</sup>
<b>PN5100 and PN6100 series</b>	20 mm	0.3	0.01
<b>PN5200 and PN6200 series</b>	20 mm	1.0	0.03
<b>PN5300 and PN6300 series</b>	20 mm	1.4	0.05
	30 mm	1.65	0.06
<b>PN5400 and PN6400 series</b>	20 mm	2.4	0.08
	30 mm	2.8	0.10
<b>PN5500 and PN6500 series</b>	20 mm	6.2	0.22
	30 mm	7.1	0.25
<b>PN5600 and PN6600 series</b>	20 mm	8.4	0.30
	30 mm	9.6	0.33

## 2.4 Materials - PN5100 to PN5600

Fig. 1



**PN5100 series actuator**



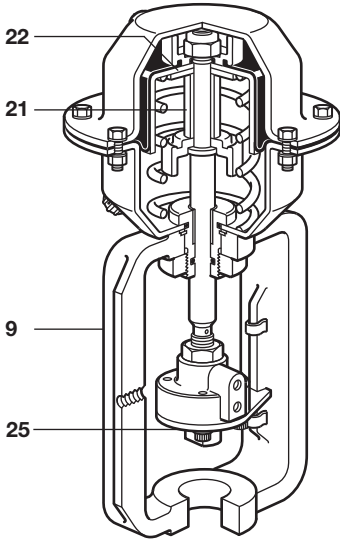
**Fig. 2**

**PN5200 to PN5600 series actuator**

No.	Part	Material
1	Diaphragm housing	Pressed steel
2	Rolling diaphragm	Fabric reinforced nitrile rubber
3	Piston	Pressed steel
4	Spring	Spring steel
5	Diaphragm clamp casting	Stainless steel
6	Nyloc nut	Steel
7	Piston guide	Stainless steel
8	DU bearing	PTFE / steel composite
9	Yoke (PN5100 series)	Aluminium
10	Pillars (PN5200, PN5300 and PN5400 series)	Steel
11	Housing securing nuts and bolts	Steel
12	Spindle	Stainless steel
13	Travel indicators	Spring steel
14	Connector	Steel
15	Indicator plate	Steel
16	Lock plate	Steel
17	'O' ring	Rubber
18	Lock-nut	Steel
19	Mounting flange	Steel
20	Cap (with vent hole)	Plastic
21	Spacer	Steel
22	Spring location washer (PN5100 series)	Steel
23	Adaptor	Steel
24	'O' ring	Rubber
25	Hex. head screws	Steel

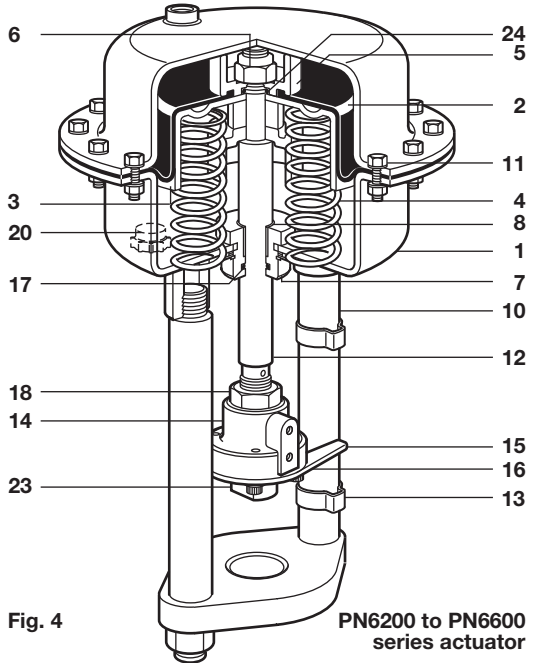
## 2.5 Materials - PN6100 to PN6600

Fig. 3



**PN6100 series actuator**

Fig. 4



**PN6200 to PN6600 series actuator**

No.	Part	Material
1	Diaphragm housing	Pressed steel
2	Rolling diaphragm	Fabric reinforced nitrile rubber
3	Piston	Pressed steel
4	Spring	Spring steel
5	Diaphragm clamp casting	Stainless steel
6	Nyloc nut	Steel
7	Piston guide	Stainless steel
8	DU bearing	PTFE / steel composite
9	Yoke (PN6100 series)	Aluminium
10	Pillars (PN6200, PN6300 and PN6400 series)	Steel
11	Housing securing nuts and bolts	Steel
12	Spindle	Stainless steel
13	Travel indicators	Spring steel
14	Connector	Steel
15	Indicator plate	Steel
16	Lock plate	Steel
17	'O' ring	Rubber
18	Lock-nut	Steel
19	Mounting flange	Steel
20	Cap (with vent hole)	Plastic
21	Spacer	Steel
22	Spring location washer (PN6100 series)	Steel
23	Adaptor	Steel
24	'O' ring	Rubber
25	Hex. head screws	Steel



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## 3. Installation

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If this actuator has been supplied already fitted to a control valve, use the information in this section.

To fit this actuator to a control valve, refer to Section 4 'Commissioning'.

**Note:** Before actioning any installation observe the 'Safety information' in Section 1.

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended installation:

**3.1** Check materials, pressure and temperature and their maximum values. **Do not exceed the maximum air pressure for the actuator.**

This maximum value varies across this product range (see Technical Data in Section 2.2).

The actuator ambient temperature limits are -20 to +110°C (-4 to +230°F). The air supply must be dry and free from oil. High temperatures will require the control valve and surrounding pipework to be adequately lagged.

**3.2** Remove protective covers from all connections.

**3.3** Determine the correct installation situation. The valve which the actuator will be fitted to should preferably be installed along a pipeline, slightly declined in the direction of flow, to ensure complete drainability of the valve body.

**3.4 Bypass arrangements** - It is recommended that isolating valves be fitted upstream and downstream of the control valve, together with a manual bypass control valve. This enables the process to be controlled manually using the bypass valve while the pneumatic valve and actuator is isolated for maintenance.

**3.5** Ensure adequate space is provided for the removal of the actuator from the valve body for maintenance purposes. The preferred mounting position is with the actuator above or below the valve, with the valve spindle vertical.

**Note:** We do not recommend the valve be installed in a horizontal position.

**3.6 Warning** - The actuator housing must only be pressurised on the opposite side of the diaphragm to the springs. The actuator is fitted with a plastic vent cap that must be left unrestricted.

**3.7** Open isolation valves slowly, until normal operating conditions are achieved.

**3.8** Check for leaks and correct operation.

**Table 1 Springs PN5000 and PN6000 Series (metric)**

Actuator type	No. of springs	Free length (mm)	Inside diameter (mm)	Colour stripe	Spring range	Travel	Weight approximate kg
PN5120 and PN6120	1	89	51	Black	0.2 - 1.0 bar	20 mm	3.5
PN5123 and PN6123	1	104	51.7	Red	2.0 - 4.0 bar	20 mm	
PN5126 and PN6126	1	106	52.5	Red	1.0 - 2.0 bar	20 mm	
PN5220 and PN6220	4	80	23	Black	0.2 - 1.0 bar	20 mm	7.8
(outer) PN5223 and PN6223 (inner)	4	96	25	Red	2.0 - 4.0 bar	20 mm	
	4	96	15.4	Red			
PN5226 and PN6226	4	88	23.5	Red	1.0 - 2.0 bar	20 mm	
PN5320 and PN6320	4	85	29	Pink	0.2 - 1.0 bar	20 mm	10.9
PN5323 and PN6323	4	100	29.5	Red	2.0 - 4.0 bar	20 mm	
PN5326 and PN6326	4	100	28	Red	1.0 - 2.0 bar	20 mm	
PN5330 and PN6330	4	87.5	28.5	White	0.2 - 1.0 bar	30 mm	
(outer) PN5333 and PN6333 (inner)	4	115	37.2	Brown	2.0 - 4.0 bar	30 mm	
	4	115	24.7	Brown			
PN5336 and PN6336	4	111	30	Brown	1.0 - 2.0 bar	30 mm	
PN5420 and PN6420	4	116	39	Black	0.2 - 1.0 bar	20 mm	18.8
PN5423 and PN6423	4	132	38.3	Red	2.0 - 4.0 bar	20 mm	
PN5426 and PN6426	4	130	39	Red	1.0 - 2.0 bar	20 mm	
PN5430 and PN6430	4	122	39	White	0.2 - 1.0 bar	30 mm	
PN5433 and PN6433	4	150	49.7	Brown	2.0 - 4.0 bar	30 mm	
PN5436 and PN6436	4	146	39.5	Brown	1.0 - 2.0 bar	30 mm	
PN5520 and PN6520	7	112	44	Black	0.2 - 1.0 bar	20 mm	26.0
PN5524 and PN6524	7	125	45	Brown	0.8 - 1.5 bar	20 mm	
PN5530 and PN6530	7	115	44	White	0.2 - 1.0 bar	30 mm	
PN5534 and PN6534	7	135	47	Blue	0.8 - 1.5 bar	30 mm	
PN5620 and PN6620	8	110	56	Black	0.2 - 1.0 bar	20 mm	36.0
PN5624 and PN6624	8	123	56	Brown	0.8 - 1.5 bar	20 mm	
PN5630 and PN6630	8	116	56	White	0.2 - 1.0 bar	30 mm	
PN5634 and PN6634	8	136	57	Blue	0.8 - 1.5 bar	30 mm	

**Table 1 Springs PN5000 and PN6000 Series (imperial)**

Actuator type	No. of springs	Free length (mm)	Inside diameter (mm)	Colour stripe	Spring range	Travel	Weight approximate lbs
PN5120 and PN6120	1	89	51	Black	3 - 15 psi	¾"	7.7
PN5123 and PN6123	1	104	51.7	Red	29 - 58 psi	¾"	
PN5126 and PN6126	1	106	52.5	Red	15 - 29 psi	¾"	
PN5220 and PN6220	4	80	23	Black	3 - 15 psi	¾"	17.2
(outer) PN5223 and PN6223 (inner)	4	96	25	Red	29 - 58 psi	¾"	
	4	96	15.4	Red			
PN5226 and PN6226	4	88	23.5	Red	15 - 29 psi	¾"	
PN5320 and PN6320	4	85	29	Pink	3 - 15 psi	¾"	24.0
PN5323 and PN6323	4	100	29.5	Red	29 - 58 psi	¾"	
PN5326 and PN6326	4	100	28	Red	15 - 29 psi	¾"	
PN5330 and PN6330	4	87.5	28.5	White	3 - 15 psi	1¼"	
(outer) PN5333 and PN6333 (inner)	4	115	37.2	Brown	29 - 58 psi	1¼"	
	4	115	24.7	Brown			
PN5336 and PN6336	4	111	30	Brown	15 - 29 psi	1¼"	
PN5420 and PN6420	4	116	39	Black	3 - 15 psi	¾"	39.9
PN5423 and PN6423	4	132	38.3	Red	29 - 58 psi	¾"	
PN5426 and PN6426	4	130	39	Red	15 - 29 psi	¾"	
PN5430 and PN6430	4	122	39	White	3 - 15 psi	1¼"	
PN5433 and PN6433	4	150	49.7	Brown	29 - 58 psi	1¼"	
PN5436 and PN6436	4	146	39.5	Brown	15 - 29 psi	1¼"	
PN5520 and PN6520	7	112	44	Black	3 - 15 psi	¾"	57.3
PN5524 and PN6524	7	125	45	Brown	12 - 22 psi	¾"	
PN5530 and PN6530	7	115	44	White	3 - 15 psi	1¼"	
PN5534 and PN6534	7	135	47	Blue	12 - 22 psi	1¼"	
PN5620 and PN6620	8	110	56	Black	3 - 15 psi	¾"	79.4
PN5624 and PN6624	8	123	56	Brown	12 - 22 psi	¾"	
PN5630 and PN6630	8	116	56	White	3 - 15 psi	1¼"	
PN5634 and PN6634	8	136	57	Blue	12 - 22 psi	1¼"	

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# 4. Commissioning

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## 4.1 Fitting the actuator to the valve

You will need: a compressed air supply, a filter regulator and pressure gauge. The regulator should be self-venting or use some alternative method to be able to exhaust the air to the actuator.

### Safety warning

**These actuators generate extremely high forces. Always work with care and avoid placing hands and fingers in any position where serious injury could result, particularly in the event of unexpected movements e.g. air failure.**

## 4.2 PN5000 series (air-to-open):

- Remove the actuator clamp nut from the control valve.
- Lift the valve stem up and down by hand to check for free movement.
- Press the valve stem down hard by hand so that the valve plug is in the valve seat.
- Remove the 4 actuator screws and the anti-rotation plate (**15** and **25**). See Figures 5 and 6.
- Make a temporary air connection to the actuator.
- Test the actuator before fitting by modulating the air pressure between the limits on the nameplate (e.g. 0.2 to 1.0 bar g, 3 to 15 psi g). Check the actuator moves smoothly.
- Apply air pressure to the maximum spring range pressure (e.g. 1.0 bar g, 15 psi g)
- Lower the actuator onto the valve bonnet and replace the actuator clamp nut. Tighten the nut to the values shown in Table 2.
- Place the anti-rotation plate (**15**) over the valve stem. Then screw the adaptor (**23**) onto the valve stem so that the valve stem thread is approximately level with (but not projecting above) the recess in the adaptor. Ensure that the nose of the anti-rotation plate straddles the right hand pillar and locates between the upper and lower travel indicators.
- Reduce the air pressure to the minimum spring range pressure (e.g. 0.2 bar g, 3 psi g)
- Screw the connector (**14**) downwards and the adaptor (**23**) upwards using an equal number of turns on each until they just touch. Align the tapped holes in the connector (**14**) to the front (see Figure 2) and align the adaptor (**23**) with the flats towards the pillars.
- Exhaust the air from the actuator and ensure that the adaptor cannot be rotated easily by hand. This is to confirm that the valve is able to close fully with the actuator connected.
- Re-inflate the actuator to separate the connector and the adaptor by 5 mm (¼"), but then without rotation of either the adaptor or connector, pull the valve stem upwards to bring the adaptor and connector together again, but this time with the valve partially open.
- Lift up the anti-rotation plate (**15**) and refit the 4 screws and spring washers to connect together the connector (**14**) and adaptor (**15**). Ensure that one flat on the connector engages against the flat of the trough hole in the anti-rotation plate. Tighten the 4 screws until the spring washers are fully compressed.
- Check that the valve plug is off its seat, then by using two spanners, tighten the two locknuts (**18**) and (**26**) against each other without allowing the stems to rotate. Ensure that the anti-rotation plate does not rub against the actuator pillar.
- Exhaust the air in the actuator.
- Slide the two travel indicators so they touch the anti-rotation plate.
- Apply compressed air to the actuator to the maximum spring range pressure and check the valve and actuator move smoothly together.
- Measure the distance between the travel indicators to confirm that full travel has been achieved.

## 4.3 PN6000 series (air-to-close):

The coupling sequence is the same as for the PN5000 (air to open) actuators described above except for:

- An air supply is not required to fit the actuator to the valve (the actuator will already be fully retracted because of the springs).
- Apply an air supply just over the minimum spring range (approximately 0.3 bar for a 0.2 – 1.0 bar spring range actuator (5 psi g for 3 - 15 psi g spring range actuator)) before bringing the two halves of the coupling together.

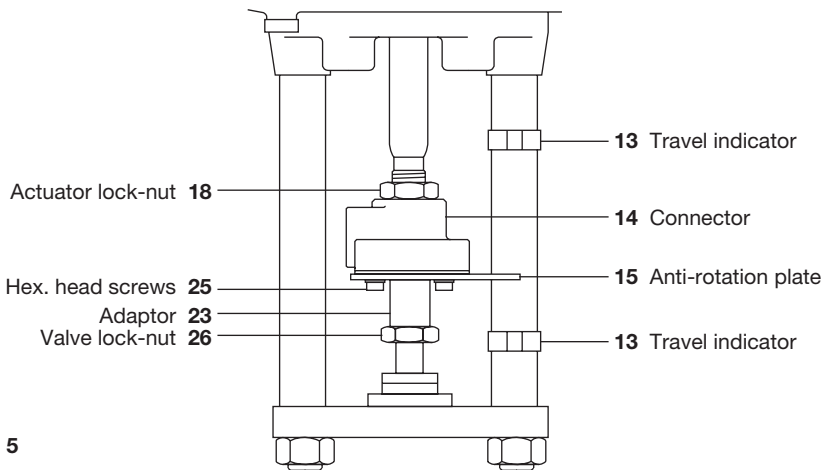


Fig. 5

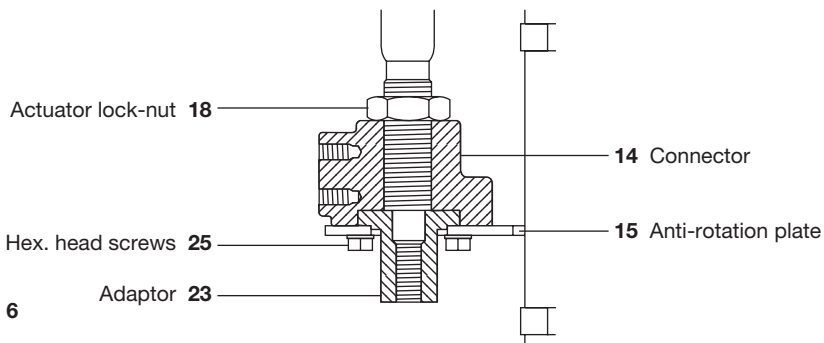


Fig. 6

**Table 2 Recommended tightening torques**

Actuator model	Flange bolts (11)	Nyloc nut (6)
PN5100 and PN6100	2 N m (1.5 lbf/ ft)	27 N m (20 lbf/ ft)
PN5200 and PN6200	2 N m (1.5 lbf/ ft)	40 N m (30 lbf/ ft)
PN5300 and PN6300	4 N m (3 lbf/ ft)	40 N m (30 lbf/ ft)
PN5400 and PN6400	7 N m (5 lbf/ ft)	40 N m (30 lbf/ ft)
PN5500 and PN6500	10 N m (7 lbf/ ft)	40 N m (30 lbf/ ft)
PN5600 and PN6600	10 N m (7 lbf/ ft)	40 N m (30 lbf/ ft)

Valve size	Actuator clamp nut
DN15 to DN50 (30 mm valve bonnet thread)	50 N m (37 lbf/ ft)
DN15 to DN50 (34 mm valve bonnet thread)	50 N m (37 lbf/ ft)
DN65 to DN100 valves	75 N m (55 lbf/ ft)

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## 4.4 Adjusting springs

The actuator spring range is indicated on the name-plate. If it is required that the spring range be checked or adjusted the following procedure should be followed:

**Note:** Adjustment of the springs will only alter the pressure of the control signal at which the valve starts to move (set point) and will not alter the spring range required to move the valve through its full travel. i.e. 0.2 to 1.0 bar spring (range 0.8 bar) set to commence to lift at 0.4 bar will require a 1.2 bar pressure (0.4 + 0.8) to obtain valve full travel.

**Caution:**

To prevent damage to the valve seat, ensure that the valve plug does not turn whilst pressing on the seat during assembly or adjustment.

To prevent damage to the diaphragm ensure that the actuator spindle is not allowed to rotate when the diaphragm is assembled within its housing.

### 4.4.1 PN5000 spring-extend actuators (Refer to Figures 7 and 8)

- Ensure the control valve has been isolated and vented to relieve pressure.
- Drive the actuator into approximately mid travel with an air supply. Using two spanners, loosen the two actuator lock-nuts (18 and 26) see Figure 5. Loosen and remove the 4 screws (25) to separate the two halves of the coupling.
- Allow the anti-rotation plate (15) to rest on top of the valve.
- Set the air pressure to the actuator equal to the new minimum spring range pressure for the actuator.
- With the valve plug on its seat screw the actuator half-coupling (14) down until it is in contact with the valve half-coupling (23). Ensure the holes for the 4 screws (25) line up.
- Refit the coupling screws (25) and anti-rotation plate (15).
- Increase the air pressure to position the valve to 50% travel.
- Using two spanners, tighten the two actuator lock nuts (18 and 26) see Figure 6 without allowing the valve stem or actuator shaft to turn.
- Release air pressure checking that the valve is closed. Apply just over the minimum control signal pressure and check for movement.
- Apply the new maximum control signal pressure to check the full travel of the valve.

### 4.4.2 PN6000 spring-retract actuators (Refer to Figures 9 and 10)

- Ensure the control valve has been isolated and vented to relieve pressure.
- Drive the actuator into approximately mid travel with an air supply. Using two spanners, loosen the two actuator lock-nuts (18 and 26) see Figure 5. Loosen and remove the 4 screws (25) to separate the two halves of the coupling.
- Allow the anti-rotation plate (15) to rest on top of the valve.
- Set the air pressure to the actuator equal to the new maximum spring range pressure for the actuator.
- With the valve plug on its seat screw the actuator half-coupling (14) down until it is in contact with the valve half-coupling (23). Ensure the holes for the 4 screws (25) line up.
- Refit the coupling screws (25) and anti-rotation plate (15).
- Alter the air pressure to position the valve to 50% travel.
- Using two spanners, tighten the two actuator lock-nuts (18 and 26) see Figure 6 without allowing the valve stem or actuator shaft to turn.
- Release air pressure checking that the valve is fully open. Apply just over the minimum control signal pressure and check for movement.
- Apply the new maximum control signal pressure to check the full travel of the valve.

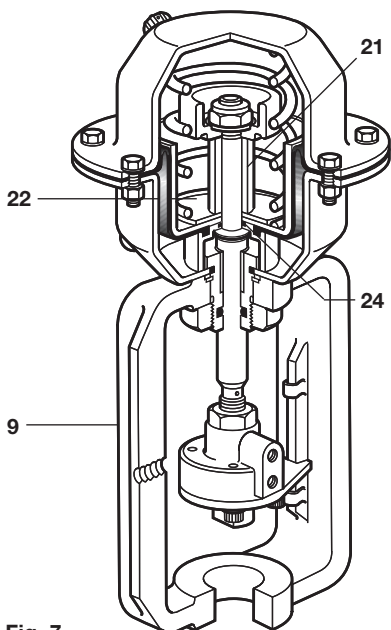


Fig. 7  
PN5100 series actuator

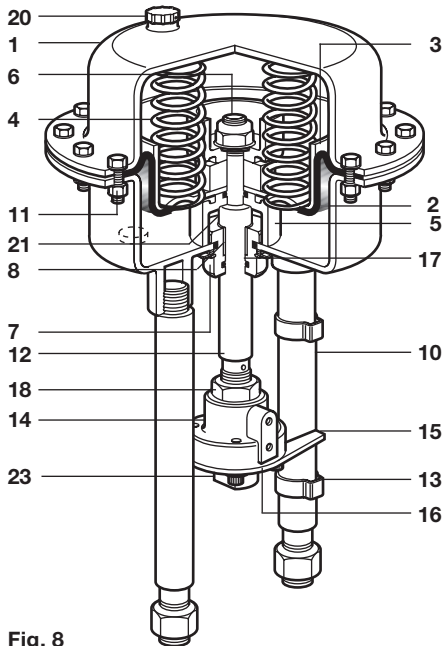


Fig. 8  
PN5200, PN5300, PN5400 series actuator

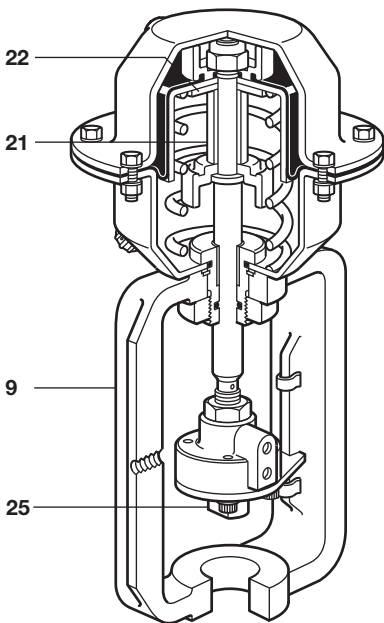


Fig. 9  
PN6100 series actuator

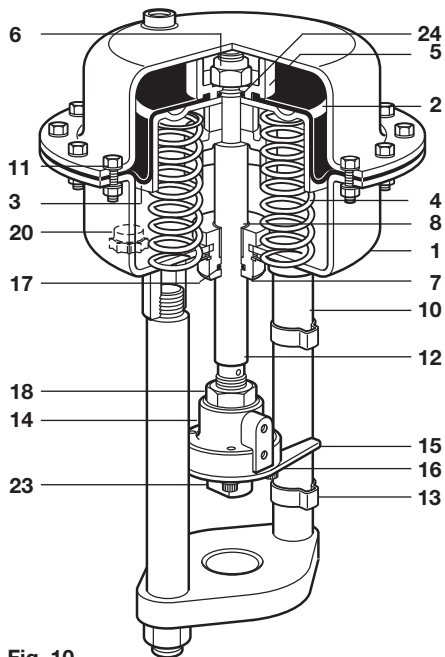


Fig. 10  
PN6200, PN6300, PN6400 series actuator

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# 5. Maintenance

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The PN5000 and PN6000 series pneumatic actuators are designed to operate for long periods before any maintenance is required. To ensure satisfactory operation it is strongly recommended that the control signal air is filtered and supplied free of oil and water. When maintenance is required this should be carried out in a workshop. The actuator should therefore be removed from its valve.

## 5.1 PN5000 Series

### 5.1.1 Removing the actuator from the valve:

Refer to the safety instructions at the front of these instructions before proceeding.

- Drive the actuator into approximately mid travel with an air supply. Using two spanners, loosen the two actuator lock-nuts (**18** and **26**) see Figure 5.
- Loosen and remove the 4 screws (**25**) to separate the two halves of the coupling.
- Loosen and remove the large nut actuator clamp nut and lift the actuator off the valve.
- Remove the air supply from the actuator.

### 5.1.2 How to fit the diaphragm kit (see Figures 11 to 15):

Remove the actuator from the valve as described in Section 5.1.1.

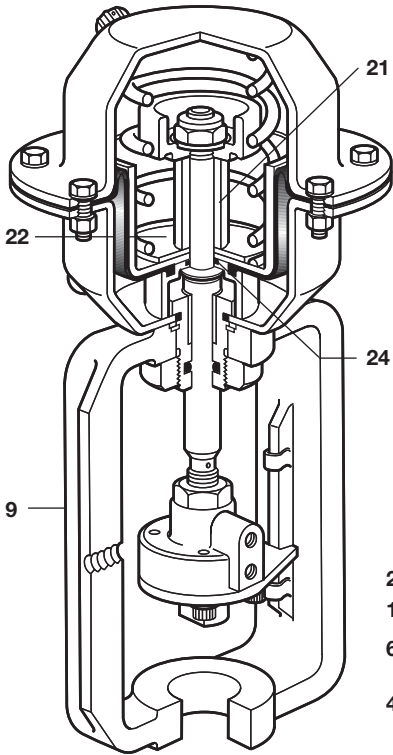
- Loosen and remove the housing screws (**11**). Where 3 longer screws are fitted, these should be removed evenly after all of the standard screws have been removed. This will allow remaining tension in the springs to be relaxed.
- Lift off the top housing and remove spring(s). Tighten nut (**18**) onto the connector (**14**). Using two spanners whilst holding the actuator connector, to prevent the actuator spindle rotating, loosen and remove the Nyloc nut (**6**) and fibre washer.
- Remove the diaphragm clamp (**5**), spacer (**21**) and on PN5100/PN6100 series single spring actuators spring location washer (**22**). Remove the piston (**3**), diaphragm (**2**) and 'O' ring (**24**).
- Refit the new 'O' ring and diaphragm ensuring that the diaphragm lip fits tightly into the groove of the lower diaphragm clamp (**5**) (See Figure 12) and re-assemble all items in reverse order fitting new fibre washer and Nyloc nut.
- Refit the top housing and tighten the screws evenly. Refer to Table 2, for torque ratings.

**Note:** Certain spring pressure ranges require three longer housing bolts to span the longer spring ranges fitted. If supplied these should be fitted 120° apart and tightened evenly. The remaining housing bolts should then be fitted and tightened evenly.

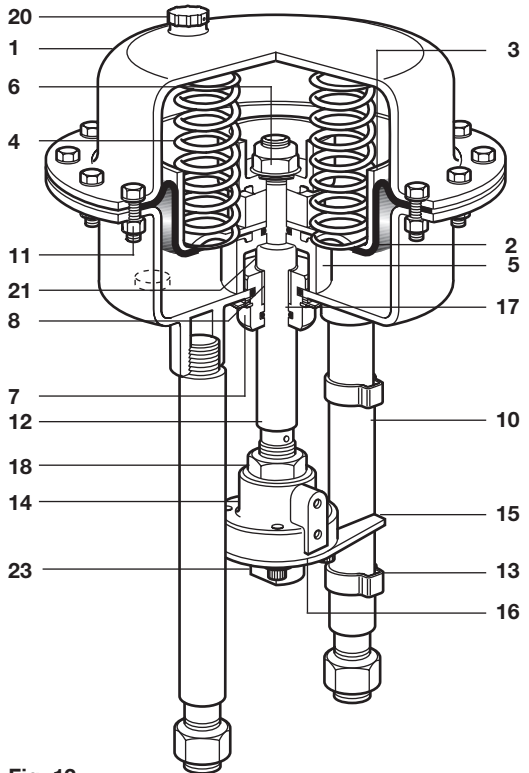
### 5.1.3 How to fit the spring kit (see Figures 11 to 15):

- Remove the actuator from the valve as described in Section 5.1.1.
- Remove the top housing as described in Section 5.1.2.
- Remove the spring(s).
- Replace new spring(s), see Figure 15, refit the top housing and tighten the bolts evenly (refer to Table 2, for torque ratings). **Note:** Some spring ranges require 3 off longer housing bolts. These will be supplied with the spare spring kits as appropriate.
- Longer housing bolts should be fitted as described in Section 5.1.2.
- Refit the actuator to the valve as described in Section 3 and recommission spring adjustment as described in Section 4.4.

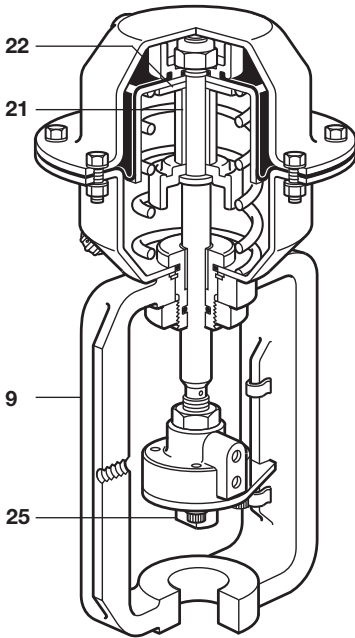




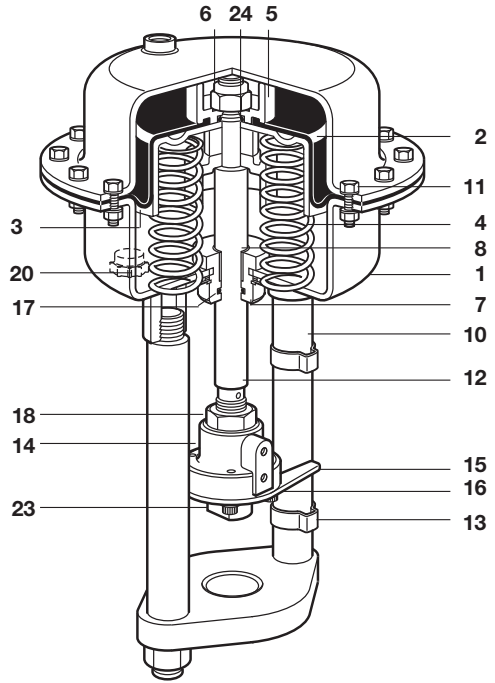
**Fig. 11**  
PN5100 series actuator



**Fig. 12**  
PN5200, PN5300, PN5400 series actuator

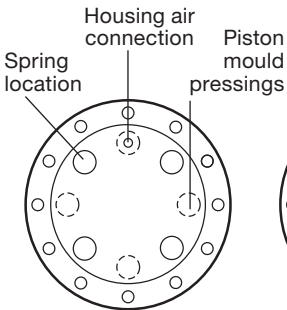


**Fig. 13**  
PN6100 series actuator

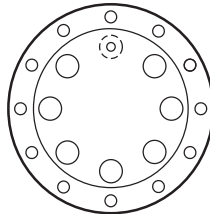


**Fig. 14**  
PN6200 to PN6600 series actuator

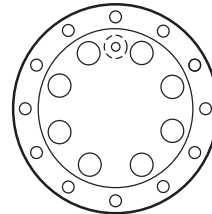
**Fig. 15 Position of multi-springs**



**4 Springs**



**7 Springs**



**8 Springs**

The number of springs fitted depends on the spring range and the actuator size. Refer to Table 1, Springs PN5000 and PN6000 series.

**Note:** Arrange springs as shown to avoid interference with housing air connection.

## 5.3 PN5000 and PN6000 series

### 5.3.1 How to fit the stem seal kit (See Figures 16 and 17):

- Remove the actuator from the valve as described in Section 5.1.1
- Remove the top housing and dismantle as described in Section 5.1.2 removing all components including spacer (21) and bottom diaphragm clamp (5).
- Withdraw the actuator spindle. Remove the 'O' ring (17) and tap out the DU guide bearing (8) taking care not to damage piston guide (7).
- Smear the new 'O' ring with silicon grease and replace. Replace the new DU guide bearing which may require gentle tapping to locate.
- Refit the actuator spindle taking care not to damage the 'O' ring or bearing surface with spindle threaded end.
- Re-assemble the components in reverse order.

Refer to Section 5.1.2 reference longer spindle screws if fitted. Refit the actuator to the valve and recommission as described in Section 5.

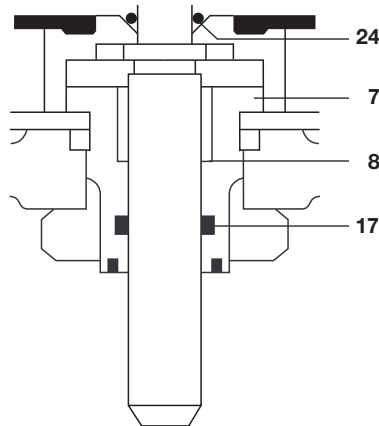


Fig. 16 PN5100 and PN6100 series

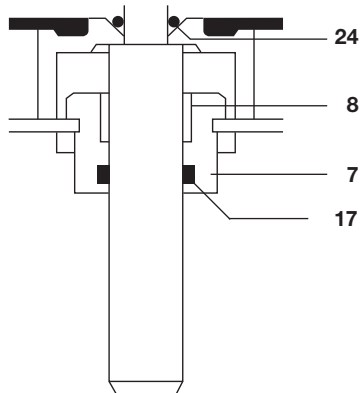


Fig. 17 PN5200, PN5300, PN5400, PN6200, PN6300 and PN6400 series

# 6. Spare parts

## 6.1 Single spring actuators

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

These spares are for PN5100 and PN6100 series single spring actuators.

For PN5200, PN5300, PN5400, PN5500, PN5600, PN6200, PN6300, PN6400, PN6500 and PN6600 series multi-spring actuators see Section 6.2.

### Available spares

Stem seal kit

(Piston guide bearing and 'O' ring's) **A, C, H**

Diaphragm kit

**D, E, F, H**

(Diaphragm, Nyloc nut and washer and 'O' ring)

Travel Indicator kit (2 off indicators)

**G**

Spring kit

**B, J**

(Spring - includes 3 off longer hex. head bolts, washers and nuts on some spring ranges).

### How to order

Always order spares by using the description given in the column headed 'Available spares' and state the actuator type.

**Example:** 1 off Stem seal kit for a PN5100 pneumatic actuator.

### How to fit

Full fitting instructions are given in Section 5.

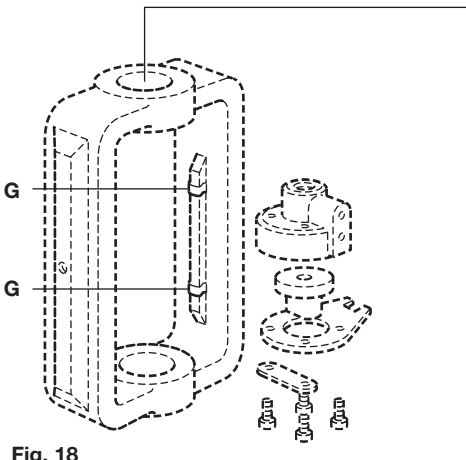
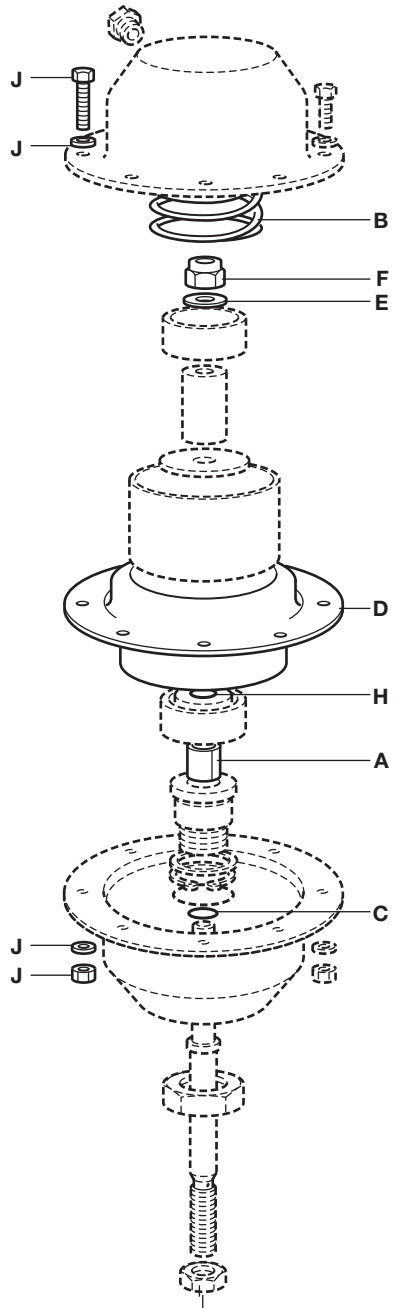


Fig. 18

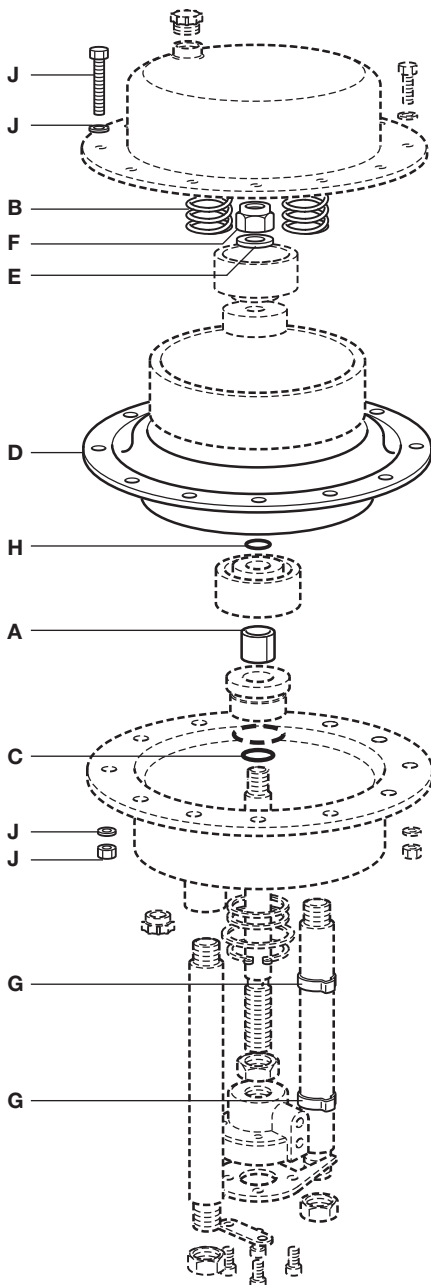


Fig. 19

## 6.2 Multi-spring actuators

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

These spares are for PN5200, PN5300, PN5400, PN5500, PN5600, PN6200, PN6300, PN6400, PN6500 and PN6600 series multi-spring actuators.

For PN5100 and PN6100 series single spring actuators see Section 6.1.

### Available spares

Stem seal kit (Piston guide bearing and 'O' ring's)	<b>A, C, H</b>
Diaphragm kit (Diaphragm, Nyloc nut and washer and 'O' ring's)	<b>D, E, F, H</b>
Travel Indicator kit (2 off indicators)	<b>G</b>
Spring kit (Set of Springs - includes 3 off longer hex. head bolts, washers and nuts on some spring ranges).	<b>B, J</b>

### How to order

Always order spares by using the description given in the column headed 'Available spares' and state the actuator type.

**Example:** 1 off Stem seal kit for a PN5220 pneumatic actuator.

### How to fit

Full fitting instructions are given in Section 5.





